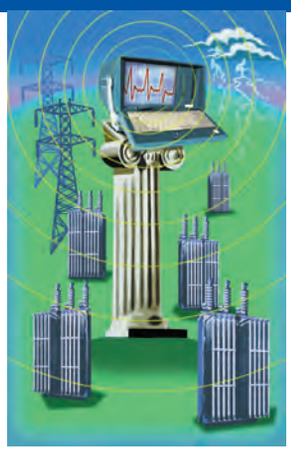
TDR9000

TDR9000 Circuit Breaker Test System Technical Specifications



TDR9000 Circuit Breaker Test Systems: Efficient way to dynamically evaluate performance of Power Circuit Breakers and Circuit Switchers.

Configuration

TDR9000's modular design has six modules; the function and number of modules in any TDR9000 instrument is user definable. Figure 1 shows the generic configuration of TDR9000 with six modules.

Module number 6 is always the system module. The function of modules for positions 1 to 5 is user selectable. If the user has not selected the module for a position, a blanking plate is provided. The module selection table shown below indicates the types of modules and their possible positions in the TDR9000 instrument.

Figure 1. Generic Configuration of TDR9000

Module Name	Functions	Possible Position	Remarks
OCB	Main and Resistor Switch Contact Timing Of Circuit Breaker	1	Optional
OCB + Motion	Main and Resistor Switch Contact Timing of Circuit Breaker With 3 or 6 Motion Recording Channels	1	Optional, Specify 3 or 6 Motion Recording Channels
Motion	3 Or 6 Motion Recording Channels	1	Optional, Specify 3 or 6 Motion Recording Channels
EHV	Main, Resistor Contact Timing and Capacitance Measurement Of Circuit Breakers. 2 Breaks Per Phase Can Be Measured With This Module.	2,3,4,5	Optional, Total of 6 Breaks Per Modules Can Be Measured. Up to 4 Modules per configuration can be provided dependent upon the number of other Module Types
Event Module	3 Analog and 3 Auxiliary Contact Channels (3A+3X)	2,3,4,5	Optional, Specify the Number Of Channels. Up to 4 Modules per configuration dependent upon the number of other Module Types
System	Communication Interface To PC, Power In, and Safety Switch. Breaker Control, Safety Ground Fusing, and/or Trigger In/Trigger Out Functions.	6	Specifies Trip close and/or Trigger in/out function

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TDR9000 can be delivered with only the required modules and can be upgraded at a future date to accommodate the changing needs of the user. The following figures indicate some of the valid configurations to the TDR9000 instrument.

OCB Blank Blank Blank Blank System

Figure 2. Minimum Configuration for Circuit Breakers

Figure 2 is the minimum TDR configuration for testing Circuit Breakers. This will measure the timing of three main contacts, insertion resistors, value measurement, and trip and close signal.

OCB + 3 motion Blank Blank Blank 3A + 3X Module System

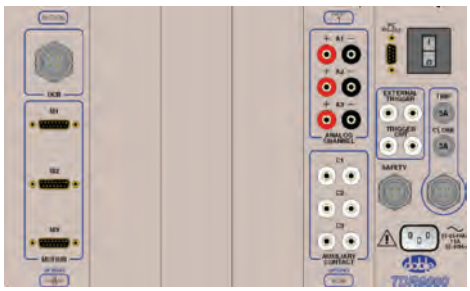

Figure 3. Minimum Configuration for Circuit Breakers with three Motion Channels, three Analog Channels, and three Auxiliary Contact Channels

Figure 3 is the configuration for testing Circuit Breakers, three phase (one break per phase) plus auxiliary switches. Includes three Motion Recording Channels, three Analog Channels, and three Auxiliary Contact Channels.

OCB + 6 motion EHV EHV EHV EHV System

Figure 4. Circuit Breaker Configuration with 6 Motion Channels

Figure 4 is the configuration for testing Circuit Breakers (one break per phase) and EHV breakers; measuring two breaks per phase for each EHV module. Four EHV modules are used for testing eight breaks per phase for 24 total breaks. Insertion resistor and value measurement timing is also included. Insertion resistor value measurement is optional.

OCB + 3 motion EHV EHV EHV 3A + 3X Module System

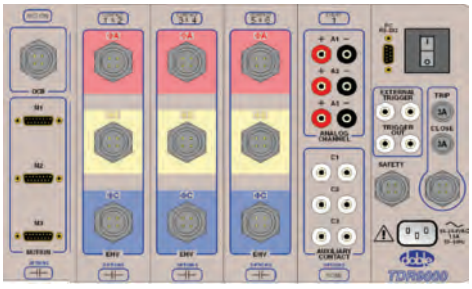

Figure 5. Circuit Breaker with 3 Motion Channels

Figure 5 is the configuration and insertion for testing EHV Circuit Breakers; measures two breaks per phase per EHV module resistor switches. Three modules are used to provide testing of six breaks per phase for 18 total breaks. Three Analog and three Auxiliary Contact Channel modules provide recording of Analog and Auxiliary Contacts. Insertion Resistor valve measurement/timing and capacitor value measurement is optional.

Technical Specifications

OCB Module

The OCB module measures the timing of main contact and resistor switches during closing or opening of an OCB Circuit Breaker. This module also measures the value of pre-insertion resistors, if the resistance value option is present.

Close And Open Timing Resolution Minimum: . . . . . .100 µs
Contact Bounce Measurement Programmable 4-100ms: . . . . . .60 µs Default
Resistor Value Range: . . . . . .10-400 Ohms or 300 - 7000 Ohms
Resistor Value Measurement Accuracy: . . . . . .± 10 % of measured value
Resistor Tabulation Qualifier . . . . . .100 µs - 200 µs

Motion Module

The Motion module records the motion of the Circuit Breaker mechanism through a Doble Digital Rotary or Linear Transducer. The input connection for the digital transducer to TDR9000 is through a 25-pin "D" connector.

Number Of Motion Recording Channels: optionally 3 or 6

EHV Module

The EHV module measures timing of main contacts and resistor switches during closing or opening of an EHV Circuit Breaker. It measures two breaks per phase for three-phases of the breaker. This module also measures the value of Pre-Insertion Resistors if the resistance value option is present.

- Number of Breaks Per Phase: 2
- Number of Phases: 3
- Close and Open Timing Resolution: . . . . . .100 µs
- Close and Open Timing Accuracy: . . . . . .±100 µs
- Minimum Contact Bounce Measurement: 4-100 ms . . . . . .60 µs Default
- Insertion Resistor Value Range: . . . . . .10-300 Ohms or 200 - 500 Ohms
- Resistor Value Measurement Accuracy: . . . . . .±10 %
- Capacitor Value Range . . . . . .75 to 10,000 pF
- Capicitor Value Measurement Accuracy . . . . . .± 5%

Event Module

The Event Module measures the timing of auxiliary contacts and analog signal. Analog channels can record voltage or current. Auxiliary channels can record wet or dry contacts.

- Number of Analog Channels: 3
- Voltage Measurement Range: . . . . . .± 300 V ac/dc
- Isolation Voltage to Ground: . . . . . .300 V
- Analog Signal Bandwidth: . . . . . .DC to 5 kHz
- Accuracy: . . . . . .± 1 % of full scale (for 300 V range only: ± 0.5% of full scale ± 1.5 % of reading)
- Number of Auxiliary Contact Channels: 3
- Sense Mode: . . . . . .Voltage Sense/Contact Sense
- Contact Sense Mode Test Voltage: . . . . . .27 V
- Voltage Sense Mode Input: . . . . . .0 - 300 V dc

System Module

The System Module is always resident in position six of the TDR9000. It provides the communication interface to the PC, power inlet, the safety switch, and the fuses. It also provides the options for Trip/Close and the Trigger-in/ Trigger-out Functions. User must select one or both of these optional functions.

Trip Close Function:	Trip	Optional Close
Peak Voltage:	300	300 Vac/dc
Maximum Current Non-Repetitive:	100	20 A dc, Pulse
Maximum Turn On Time:	10	10 µs
Maximum Turn Off Time:	10	10 µs

Trigger-In/Out Function

Trigger-In Function

- Sense Mode: . . . . . .Voltage Sense/Contact Sense
- Contact Sense Mode Test Voltage: . . . . . .27 V
- Voltage Sense Mode Input: . . . . . .0-600 Vdc

Trigger-Out Function

Software controlled solid-state switch for external synchronization and control

- Active . . . . . .Normally open
- Input Voltage . . . . . .300V peak max
- Input Current . . . . . .0.67A peak

Tests:

The following tests can be carried out using PC and TRX Field software system:

Trip- . . . . . .Reclose - Standing
Close . . . . . .Reclose - Delay
Trip Free - Standing . . . . . .O-C-O Standing
Trip Free - Delay . . . . . .O-C-O Delay
Trip Free - Contact 1 Make . . . . . .O-C-O Contact 1 Make

TDR9000 supports the following Signal Parameters:

Trip/Close Command

Pulse Width . . . . . .8.0 to 1600 ms / 0.5 to 96 cycles
Resolution . . . . . .0.1 ms / 0.1 cycle
Trip Command Current Range . . . . . .0 to 2/5/20/100 A
Close Command Current Range . . . . . .0 to 0.2/1/5/20 A
Trip/close Frequency Response . . . . . .dc to 5 kHz

Delay

Duration . . . . . .0 to 1600 ms/ 0 to 96 cycles
Resolution . . . . . .0.1 ms / 0.1 cycle

Recording Length

Duration . . . . . .500 ms, 1.6 s, 10 s, 30s, 1 min, 5 min, 20 min

Table 2 Motion Transducer Specification

	Linear Motion	Rotary Motion
Range	0.0 to 40.0"/0-1000mm	0.0 to 2880.0°
Accuracy	+/-0.1% of measured value +/-0.1" max error	+/-0.1% of measured value +/-0.1° max error
Measurement Resolution	0.00125"/0.03mm	0.09°
Display Resolution	0.002"/0.05mm	0.1°
Velocity	50 ft/sec/ 15m/s max	120 rev/sec max
Acceleration	1200g for 50 µs max	30 x 10^6 degrees/second^2 max

Environmental

Storage Temperature Range . . . . . .-25°C to +70°C
Operating Temperature Range . . . . . .0°C to +50°C
Storage Humidity . . . . . .95%, non-condensing
Transport Shock . . . . . .High impact, molded, flame retardant ABS - meets National Safe Transit Association testing specification No. 1A for immunity to severe shock and vibration.
Electro Static Discharge . . . . . .IEC 1000-4-2 Level 4(formerly IEC 801-2)

Physical

Maximum Weight . . . . . .30 lbs.(13.6 kg)
Dimensions . . . . . .10.0"H x 16.0" W x 15.5" D (25.4 cm x 40.6 cm x 39.4 cm)
Input Power . . . . . .90-264 Vac, 47-63 Hz

The TDR9000 comes with all required cables for test connections and power.

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